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THE PRESENT CONDITION OF THE SOCIAL SCIENCES[1]

A NEW world is being born. Out of the chaos and the conflict of the present it seems certain that great social changes are bound to emerge. At the birth of this new social world it is the social sciences, not the physical, which must preside. Yet we who are interested in the development of the social sciences must candidly ask ourselves how far they are fitted to assist in the birth of a new social world. How far are they fitted to lead and to guide in the work of social reconstruction which must follow the World War? Do they command such general respect and confidence that the masses will turn to them for guidance to avoid the mistakes of the past and to make secure the foundations for a worthy civilization in the future? Are their leaders so united on fundamentals that, though they may differ regarding minor details, yet they substantially agree on the general direction which reconstruction in our political, economic, educational, domestic and general social life should take? Can, in brief, the social sciences present such an accurate body of information and of generalizations from facts that in this crisis sane men will turn to them voluntarily for guidance, much as they would to the physical sciences if any one were called upon to build a bridge?

Such questions as these are of more than merely academic significance. Germany has taught the world in this war the value and the possibilities of social organization;

[1] An address before the local chapter at the University of Missouri of Alpha Zeta Pi, a society for encouraging scholarship and research in the social sciences.

and organization is destined to be a watchword of the future, whatever the outcome of this war. Organization of our political, economic, educational and general social life will be tried on a scale never before attempted, at least in English-speaking countries. Will the organization attempted be wise or otherwise? Wise social organization is evidently what we need, but it can not be successfully accomplished without scientific knowledge of our social life. Are we, then, as students of the social sciences prepared to give reliable scientific guidance in every field of social activity? Or have we only conflicting opinions to offer? We should face such questions as these candidly. The watchword of the present is "national service." Are we fully prepared to do our "bit" in the work of social reconstruction which our national welfare and security in the future demand? That, for us who are engaged in scientific and educational work along social lines, is a more important question than whether we are ready to do our "bit" in the war itself; for whether this war will prove to be a great victory for humanity and civilization will be evident, not upon the announcement of the terms of peace, but a generation or two thereafter.

What, then, are the social sciences ready to do for civilization?

The editor of *The Scientific Monthly*, in commenting on the papers presented before the Section for Social and Economic Science of the American Association for the Advancement of Science in the year 1915, published in the April, 1916, issue of that journal, said:

> An obvious difference exists between the eleven sections of the American Association devoted to the natural sciences and the one devoted to the social and economic sciences. The former are in the main concerned with the discovery of truth, the latter in the main with the expression of opinion.

While the work of the Social and Economic Section of the American Association may, perhaps, justly be held to be not representative of the best work in the social sciences, yet the general justice of this implied criticism of the social sciences can not be doubted. In spite of the labors of many eminent minds, in the main the social sciences, especially those of a theoretical nature, do remain still to-day in the realm of opinion rather than in the realm of accurate and verified truth. This is shown by the fact that not infrequently even in academic circles they are developed in the service of fads, social, political, metaphysical and methodological. This was once supposed not to be true of the older social sciences, such as economics and politics, but in the light of recent events it would be a very rash man who would affirm that even these older sciences have yet passed from the stage of opinion to that of verified scientific knowledge. It may possibly be said that when the whole world is in a condition of confusion and revolution, it is too much to expect that the social sciences will not also reflect this condition. But science is supposed to be something which, aiming as it does at the discovery of objective, verifiable knowledge, transcends the mere *Zeitgeist*. Besides, if the social sciences are in a state of confusion, the world can scarcely be expected to look to them to lead it out of its present confusion into a new and better day of peace, harmony and agreement as to the fundamentals of human living. It is true that the disagreements among the more carefully trained scientific social thinkers are much less than what the public suppose; but it is useless to deny that there are disagreements of the most fundamental sort, and that the social sciences suffer, as well as the world, from such disagreements. Of course, the lateness of their development and the complexity of the subject-matter with which they deal ex-

plains much of their unsettled condition and of the lack of harmony among their devotees. Nevertheless, this does not explain all. There are other conditions which explain the present backwardness of the social sciences, which are more remediable, and which it should be the object of this society to aid in removing. It is the purpose of this paper to point these out, and I believe that the chief among them is the failure of the leaders of the social sciences to develop an adequate, sound and generally accepted scientific method. Scientific method may not be very important in the laboratory sciences where mechanical instruments of precision often take the place of methods of reasoning; but in the social sciences "a sound method is alone competent to the uniform and constant discrimination of truth from error." As has been well said, what the microscope is to biology, or the telescope to astronomy, that a sound scientific method is to the social sciences. In other words, the tendency toward methodological "fads" or one-sidedness is one of the most serious impediments to the development of the social sciences, and at the same time one most easily removable.

What, then, may be regarded as a sound and adequate method for the social sciences? My thesis is that such a method must be an extension and an adaptation of the methods employed by the so-called natural sciences. If it be objected that this means materialism or at least "mechanistic interpretation" in the social sciences, the reply is that this is a mistake. Science builds itself upon no universal, *a priori* hypothesis. People who try to make it do so are imbued with the metaphysical rather than with the scientific spirit. The spirit and the method of all true science is matter-of-fact, inductive and pragmatic, not deductive and dogmatic. It takes the world as it finds it, correcting common sense only as it is shown to be in error. It explains phenomena, not by reference to some universal abstract principle, such as mechanical causation, but by describing fully all the conditions essential to their appearance. But this is exactly what the social sciences do also. They also seek to explain the phenomena with which they deal by observing and describing all the conditions which seem to be in any way connected with their appearance. Science is therefore one, even though reality may be complex; and the same general spirit pervades all science, even though different methods of investigation and research have to be developed and applied in different realms of phenomena. Moreover, inasmuch as the universe is interdependent in all its parts and forms a working unity, it follows, as Comte long ago pointed out, and as every worker in the natural sciences practically acknowledges, that the more complex sciences are dependent upon the less complex, and the more specialized upon the more general.

An immediate corollary from these conclusions is that the social sciences should preserve the point of view and utilize the results of the natural sciences; that is, they should preserve the same matter-of-fact method and build themselves upon the antecedent sciences as their basis. This is in no sense to surrender the inductive spirit of science. The inductive spirit is behind all science, and when a worker in a more complex science borrows a principle or a truth from a simpler science and applies it in his own field, he is not thereby giving up the inductive spirit of science, even though for the time being he is working deductively. For there is no reason why a student of society should have to work out for himself independently truths which have already been discovered through inductive processes by investigators in other realms. The true inductive spirit is not opposed to the proper use of deduction. What passes for induction in the social sciences—the

mere gathering and amassing of facts—is often but superficiality under another name. If there is any hope of the social sciences getting beyond the stage of mere socially approved opinions, and of coming to substantial agreement on fundamental issues, it must be through basing themselves upon the established results of antecedent sciences, particularly of biology and psychology. Yet the natural-science point of view is largely lacking in much of the literature of the social sciences to-day. Many of their devotees seem to think that the world of human society, of social phenomena, is a thing apart, to be studied and understood by itself. This is noticeable, not only in politics and in economics, but also in sociology, where for a number of years a considerable school have openly maintained that the biology and psychology of the individual have little effect upon the group or social life, and that therefore the social sciences can not base themselves upon biology and psychology. Even the most notable book published in sociology during the present year—Professor R. M. MacIver's "Community"[2]—though in many ways a remarkable book, showing both penetration and breadth of view, fails to recognize explicitly the close connection between the natural and social sciences and denies altogether that sociology should in part be based upon psychology.

But two of the social sciences at the present time may be said to have attained even to a partly adequate method if judged by the standards which have been just set forth. Both these sciences, however, are preliminary and methodological to the more theoretical and applied social sciences. They are anthropology and history. Anthropology, on account of its close connections with zoology, especially in its physical sections, has long had the point of view of the natural sciences, though for a long time its work was narrowly individualistic. The new school of social anthropologists, however, have developed a social point of view while making full use at the same time of modern psychology. The achievements and methods of this school we shall touch upon later. Suffice to say that modern anthropology has demonstrated its right to a place among the social sciences, and in its carefully worked out and highly conscious methods it is perhaps the best equipped of all of them. This explains its rapid recent advance. But dealing as it does with human origins in general and with social and cultural origins in particular, its work from any practical viewpoint must be regarded as preliminary to the other social sciences.

History, the oldest of the social sciences, has long since worked out an elaborate methodology for the critical determination of events, conditions, and institutions in the human past. But only recently has a new school of historians, led chiefly by Professor J. Harvey Robinson in this country, attempted to bring history into vital touch with the natural sciences, on the one hand, through anthropology, and with the theoretical social sciences on the other, through social psychology. From this "new history" we can expect much; but from the standpoint of the theoretical and applied social sciences history is chiefly important as a method of approach to their problems. It is, indeed, of vital importance; and I know of no surer touchstone of sanity in the social sciences than the amount of consideration which is accorded to human history. But every historian should know, what every economist, sociologist, and political scientist does know, that the historical method has not yielded the results which were once hoped from it. By itself the historical method is inadequate from the very nature of recorded human history. The historical evidence of the past is at

[2] The Macmillan Company, 1917.

best but fragmentary and fails to yield all the knowledge which we need for guidance in the complex social conditions of the present.

This perception has led to the search for, and the emphasis upon, other methods of social research and investigation. Chief among these has been statistics. Statistics has had many enthusiastic advocates as *the* method of the social sciences, both among economists and sociologists, a recent advocate going so far as to say that the statistical method bears much the same relation to the social sciences that the experimental method bears to the physical sciences.[3] There can be no doubt that statistics presents the one means of measuring social facts upon a wide scale, and so of rendering our knowledge of mass movements exact. In so far as exact measurements are needed in the social sciences (and they are needed not less than in other sciences), the statistical method must remain a highly important part of the methodology of the social sciences. It is greatly to be regretted, therefore, that as yet we possess adequate statistics of only very small sections of our social life; and it is manifestly our duty as students banded together to promote scholarship in the social sciences to do all that we can to promote the accurate collection and study of social statistics. However, apart from the fact that statistical methods have still to be enormously developed before they are susceptible of application to the general problems in the field of the social sciences, it is evident that there are many problems in political science, jurisprudence, sociology and other social sciences which by their nature are not amenable to statistical treatment. It is noteworthy, moreover, that the natural sciences have made but a subordinate use of statistics. It is true that they have other instruments of precision, but the experimental method, so far from closely resembling the statistical method, is rather mere observation under controlled conditions. It would seem, therefore, that the nearest approach to it in the social sciences would be the direct observation of social life under mentally controlled conditions. It is true that social conditions can rarely be fully controlled, but observation by trained observers can be, and the results can be checked up with the aid of the historical, comparative, and statistical methods.

A little over a dozen years ago the practical needs of social workers for more accurate and scientific knowledge of the social conditions in the communities in which they worked led to their instituting programs of social investigation which they called "social or community surveys." One of the first and most extensive of these "surveys" was the well-known "Pittsburgh Survey." A great number of these surveys have now been made in widely scattered communities, and the movement has become specialized, so that now we have surveys of different sorts, such as "health surveys," "educational surveys," "industrial surveys," "agricultural surveys," etc. It will be noted that the movement arose entirely to meet practical needs, and that there was no thought of making a contribution to scientific methods of studying the social life. At first, the movement was narrow. The "survey" was confined largely to the material aspects of the social life, such as sanitation, housing, wages, etc. Moreover, the survey was supposed to be an entirely local and community affair, and though statistical accuracy was emphasized, but little attention was paid to history and

[3] See the suggestive articles on "The Experimental Method and Sociology" by Professor F. Stuart Chapin in the February and March, 1917, issues of *The Scientific Monthly*.

comparison. How, then, does this movement, which many scientific men have doubtless looked upon as a passing fad, contain the promise and the potency of an adequate method for the social sciences? Science demands world-wide, or universal, generalizations, whereas the survey is a local or community affair.

Before answering this question it may be well to point out that social workers, though they have popularized it, were not the first to employ the "survey" method. The anthropologists may probably claim that honor. The old-time anthropologist was a laboratory or library worker, relying largely upon the reports of travellers and missionaries for his knowledge of customs and institutions. The new anthropologist is a field worker. Moreover, he works cooperatively, organizing expeditions which undertake extensive "anthropological surveys," investigating minutely the customs, institutions, ideas, beliefs, and history of the population of a given region. Such have been, for example, the Jesup North Pacific Expedition and the Torres Straits Expedition. Very valuable scientific results have come from such anthropological surveys, especially when their facts have been compared one with another.

Now this illustration shows that survey methods are not limited, that surveys properly made are of far more than local significance, and that the most valuable scientific facts and principles can be secured through the careful survey of different communities and their comparison. The survey method might, indeed, properly be called the laboratory method of the social sciences; for the world of human beings, the *community*, whether large or small, is the only possible laboratory which the social sciences can employ. Like laboratory methods in the natural sciences, this intensive study of the social life permits the isolation of phenomena and at the same time their study by a combination of methods. It is as if nature had set a great many experiments going at once in many different laboratories, and the scientific observer had only to devise adequate methods of checking up the results. It is not necessary, of course, that such inductive study should go on indefinitely for certain results, as some have claimed; on the contrary, a single accurate observation may give a clue which a comparatively small number of similar observations may suffice to establish as accurate scientific knowledge. Neither need the community which is studied by the survey method be a small, local area. It can be of any size, provided we perfect our methods of observation. Why should not the survey method be extended to the life of the whole nation? The Census Bureau, it may be said, has long undertaken such work, but not on the scale demanded by the social surveyor, much less by the scientific student of society. Moreover, social life is no longer national, but international. What is needed most of all, of course, is a survey of our whole civilization. Such a vast cooperative undertaking may, at first thought, seem fantastic; but it is surely the logical goal of the social sciences on the side of induction; and practically we surely need to know much more about the conditions of our whole civilization than we have known if rational social control over human life is to be made possible.

We are now prepared to see that the survey method is not opposed to the historical method of approaching social problems. On the contrary, the survey method includes the historical method as a necessary part. The survey must be extended in time if it is to be of scientific value. The statistical method is also evidently a part of any adequate survey work. Exact

measurement of all phenomena that can be measured is needed. The survey method is, indeed, but a name for the proper combination of all inductive methods in the scientific study of the social life. But therein lies its promise of becoming an adequate method for the social sciences of the future; for no method will be adequate in their complex field which is not synthetic. As their inductive instrument the survey method of studying social facts will not preclude the social sciences from making full use of psychology, biology and geography. For social facts could not be interpreted, as we have seen, without the use of these antecedent natural sciences; and hence any method to be fully scientific must be a synthesis of inductive results

It may be objected that the use of such a complex, synthetic method in the social sciences will be beyond the ability of ordinary minds. That I do not believe. To be sure, the level of scholarship in the social sciences will have to be raised before it can be used successfully. I am not, however, among those who believe that the present level of scholarship in the social sciences is lower than in the so-called natural sciences. I believe the contrary. But I would urge that the grave responsibility resting upon us as leaders of social thought, as well as the complexity of the problems with which we deal, demands higher standards of scholarship among us than among the students of the natural sciences. In this grave crisis of our civilization it is time that we recognize this fact. It particularly demands that we be more than mere specialists in economics or administration, in history or anthropology, in education or law; but that we have that breadth and depth of scholarship which will enable us to see on all sides of, and to the bottom of, our particular problem.

The practical difficulties, however, of employing such a comprehensive, synthetic instrument of social investigation can not be ignored. The survey method of social investigation is still very far from being developed to the point which I have described. It can not be so developed without the aid of governmental and educational agencies. It is the same with the social sciences as with all sciences, that they can not flourish without the aid and encouragement of society at large, especially through governmental and educational institutions. I believe, however, that such aid will be forthcoming if we keep our standards of scholarship sufficiently high, and work together to show the need for the development of all the social sciences.

In this crisis, therefore, let us who are students of social life close up our ranks and work together for the establishment and diffusion of that accurate social knowledge for lack of which the world seems almost on the point of perishing; for this crisis has clearly demonstrated that it is to the social sciences, not to the physical sciences, to which the world must look for its salvation. And it is upon us who are students of the social sciences that the responsibility for their future development and usefulness to humanity must rest.

CHARLES A. ELLWOOD
UNIVERSITY OF MISSOURI

WORK OF THE NATIONAL RESEARCH COUNCIL

MAJOR R. A. MILLIKAN, vice-chairman of the National Research Council, wrote, on September 7, a letter to Dr. Cary T. Hutchinson, secretary of the Engineering Foundation, reviewing the work of the council. The letter as "edited for publication" in the *Proceedings* of the American Institute of Electrical Engineers is as follows:

The following is a statement of some of the work of the National Research Council, condensed with difficulty on account of the great variety and scope of the council's activities.

All of the work of the Research Council that touches upon Army or Navy problems is carried on with the advice, cooperation or control, as the case may be, of the representatives of the various departments of the Army or Navy under which such work comes.

The council has cooperated in the establishment and organization of the submarine experimental work at Nahant and has also established a very active submarine station at New London, another at San Pedro, California, and has been instrumental in the organization of groups working at New York, Chicago and Madison, Wisconsin.

There has resulted a great practical advance in the art of submarine detection which it is not desirable to go into further.

The physics committee of the council has distributed to various groups twenty or more large problems in physics, which are being actively worked upon and some of which have already been solved. Among the latter are the location of aircraft by sound, the development of fire control for anti-aircraft guns, telephoning between airplanes, protection of balloons from ignition by static charges and the development of new and improved methods of measuring muzzle velocities.

The chief officer of the signal corps of the Army has asked the Research Council to act as the Division of Science and Research of the Signal Corps, and in this capacity the council has organized a sound ranging service in the signal corps, a new meteorological service in the signal corps, and is now drawing specifications for scientific instruments to be used on airplanes. It has sent a dozen of the best physicists in the country to France to aid the American Expeditionary Forces with their scientific knowledge and is selecting a personnel of several hundred men who are to be engaged in the scientific services of the Army and Navy.

The chemistry committee has perfected an elaborate organization for the handling of all of the chemical problems which arise in the Army and in the Navy, and it has distributed some 150 chemical problems which are being attacked in the chemical laboratories of the country.

The psychology committee has presented to the Secretary of War and the adjutant general a vast program for the selection of officers for the Army from officers' reserve camps and for the classification of drafted men. In fact it has called in most of the best known psychologists of the country and has organized them and employment experts into a large group in whose hands the War Department has placed the largest responsibilities regarding the examination and selection of men.

The medical committee has enlisted the services of a large number of medical men of the country both in medical research problems and in the regular work of the sanitary corps of the Army.

The engineering committee has contributed in no small degree to the development of devices for the protection of ships from submarines. It has organized a large group which are now working on the development of steel protective devices for use of the soldiers at the front, and through cooperation with the National Advisory Committee for Aeronautics it has carried on extensive and important researches in the development of airplanes and airplane engines.

Turning to the work of the special committees of the council, the nitrate committee has made an elaborate study and report which has been made the basis for the expenditure by the government of large sums of money upon the erection of a nitrate plant.

The gas warfare committee has had for six months 120 chemists working on the problems of gas warfare and the results already attained have been of the utmost importance—so important that the Army and Navy have placed large appropriations at the disposal of this committee for its researches.

The optical glass committee, by taking from the research laboratories like the geophysical laboratory and the bureau of standards, a dozen more silicate chemists and putting them directly in the works of the Bausch and Lomb Company and the Pittsburgh Plate Glass Company, has in six months' time developed in America the production of optical glass from nothing up to 20,000 pounds a month and in two months more this figure will have been multiplied two or three fold.

The psychiatry committee has established abroad a laboratory for the study of shell shock.

The foreign service committee, which the council sent abroad at once upon the outbreak of the war, was wholly responsible for the sending back to this country of a French, English and Italian scientific mission, which brought with them the contributions which science had made to the war, both in the matter of instruments and methods, and unquestionably saved months of time in putting the United States abreast of the European situation, as regards modern scientific methods in warfare. It is difficult to overestimate the stimulus to American participation in the war which resulted directly from the action of the Research Council in sending abroad at once this foreign service committee composed of seven of the best scientists in the country.

These are a few of the results which have followed from the assistance which the engineering foundation gave in the bringing into being of the National Research Council. It is hoped that they are only a small part of the results which will have been attained by the end of the second year of its existence.

SCIENTIFIC EVENTS

CELEBRATION IN HONOR OF DR. HENRY FAIRFIELD OSBORN

ON the afternoon of September 29 a large and informal gathering of friends surprised Dr. Henry Fairfield Osborn at his home at Garrison-on-Hudson in honor of his sixtieth birthday. The visit had originally been planned for August 8, his birthday, but was necessarily deferred until September 29, which chanced to be the thirty-sixth anniversary of his marriage with Mrs. Osborn. The American Museum of Natural History was represented by Mr. Madison Grant of the board of trustees, by the members of the scientific staff and their wives, by the members of the department of vertebrate palæontology and of the administrative and technical staffs and their wives. The New York Zoological Park and the New York Aquarium, Columbia University and Princeton University were also represented. The weather was favorable so that the arrangements for luncheon on the lawn were enjoyably carried out. After the luncheon Professor Edmund B. Wilson, of Columbia, read congratulatory messages from Colonel Theodore Roosevelt, President Nicholas Murray Butler, and Mayor Mitchel, and presided at the addresses, the speakers including Mr. Madison Grant, Professor McClure of Princeton, Mr. William Church Osborn, Professor Bashford Dean, and Dr. Frank M. Chapman. Dr. F. A. Lucas gave a discourse on "Birthdays," after which he presented to Professor Osborn an illuminated message of congratulation bearing forty-six signatures. The text of this message and the signatures were as follows:

TO

HENRY FAIRFIELD OSBORN

Your friends, who are bound to you by many years of treasured association, bring this message of congratulation upon your sixtieth birthday.

We have followed with increasing admiration the progress of your labors during the past forty years in an ever widening field of science. We are proud of the splendid record of your achievements: admirable researches accomplished and in progress, great institutions of science and education founded and fostered, high scientific ideals nobly illustrated and practised.

May the coming years further expand the orbit of your influence. May your spirit of high enthusiasm, thoroughness and unwearying industry, sustained by the cordial sympathy and cooperation which you have always shown towards others, become more and more characteristic of American science.

J. A. ALLEN,	EDMUND B. WILSON,
L. P. GRATACAP,	WM. H. CARPENTER,
GEORGE F. KUNZ,	BASHFORD DEAN,
E. O. HOVEY,	HENRY E. CRAMPTON,
FRANK M. CHAPMAN,	T. H. MORGAN,
JONATHAN DWIGHT,	GARY N. CALKINS,
ROY W. MINER,	J. HOWARD MCGREGOR,
W. D. MATTHEW,	W. B. SCOTT,
WALTER GRANGER,	CHAS. W. MEAD,
BARNUM BROWN,	CHESTER A. REEDS,
A. HERMANN,	JOHN TREADWELL NICHOLS,
WILLIAM K. GREGORY,	CLEVELAND H. DODGE,
FREDERIC A. LUCAS,	MADISON GRANT,
THEODORE ROOSEVELT,	PERCY R. PYNE,
N. L. BRITTON,	W. T. HORNADAY,
GEO. H. SHERWOOD,	CHAS. H. TOWNSEND,
R. W. TOWER,	C. W. BEEBE,
MARY C. DICKERSON,	RAYMOND L. DITMARS,
PLINY EARLE GODDARD,	S. H. CHUBB,
CLARK WISSLER,	ALBERT THOMSON,
FRANK E. LUTZ,	E. S. CHRISTMAN,
FRED H. SMYTH,	A. E. ANDERSON,
GEO. N. PINDAR,	H. LANG.

August 8, 1917

THE LABORATORY OF THE U. S. FISHERIES BIOLOGICAL STATION AT WOODS HOLE

THE work of the staff at the station of the Bureau of Fisheries at Woods Hole during 1917, has been concentrated during the summer on problems directly bearing on the conservation of food fishes and the utilization of marine forms not now appreciated in this country as food. Researches on the best methods of desiccating fish for storage, on the rehydration of dried fish and on the food value of such preparations were undertaken by Dr. G. G. Scott, of the College of the City of New York. Observations on the relation of parasites, especially nematodes, to the edible qualities of food fishes were made by Dr. Edwin Linton of Washington and Jefferson College. Investigations on the bacteriology

of food fishes during refrigeration and on the methods of combating "rust" in salt fish were carried on by Dr. W. W. Brown, of the College of the City of New York. The food value and the possible methods of marketing squid, the utilization of the waste products of grayfish, optimum methods of canning as applied to fish, the utilization and preservation of shark and certain problems concerning the nutrition of oysters were investigated by Dr. P. H. Mitchell, of Brown University. Mr. A. E. Barnard, Mr. F. R. Dieuaide, Mr. B. N. Harris and Mr. H. E. Stewart were scientific assistants. Dr. P. H. Mitchell acted as director. The laboratory opened on June 20 and closed September 8.

THE AMERICAN PSYCHOLOGICAL ASSOCIATION

The council of the association has voted unanimously to hold the annual meeting at Pittsburgh instead of Ann Arbor, as was previously announced.

The Pittsburgh meeting will be held on Thursday to Saturday, December 27, 28 and 29. The sessions will take place in the school of applied design of the Carnegie Institute of Technology. The sessions will overlap the meetings of the American Association for the Advancement of Science which holds its convention in Pittsburgh, from December 28 to January 2. Sections H and L of the American Association for the Advancement of Science will meet in rooms in the same building, and it is probable that there will be joint sessions with these sections. Arrangements will be made for visiting the psychological laboratory and psychological clinic at the University of Pittsburgh, which is near by. The meeting place is within walking distance of the hotel headquarters at Hotel Schenley. In order to reach the meeting place by street car, the members should take a car running to Forbes Street and Woodlawn Avenue and leave the car at Woodlawn Avenue. Those who come to Pittsburgh from the East on the Pennsylvania Railroad and wish to go directly to the meetings, should leave the train at the East Liberty Station and take a street car at the corner of Penn and Shady Avenues.

The annual dinner will occur on Thursday evening, December 27, at the Pittsburgh Athletic Association, which is across the street from the hotel headquarters. The dinner will be followed by the annual presidential address and smoker.

Hotel headquarters will be at the Schenley which is also to be the hotel headquarters for the American Association for the Advancement of Science. It is the only hotel immediately accessible to the meeting places; the other hotels are located in the business district which is from twenty to thirty minutes distant, by street car. Professor Miner, as local member of the executive committee, will be glad to arrange for rooms in the dormitories at the Carnegie Institute of Technology or in neighboring boarding houses, for those who may so prefer. Luncheons will be served at the Carnegie Institute of Technology.

The program will be sent to members on December 1. In order to have it finished by that date, all titles, together with abstracts, must be in the secretary's hands by November 24. It is proposed as in previous years, to print the abstracts in advance of the meeting. They will then be available for distribution among the members in attendance. The attention of the members is called to a motion defining the functions of the program committee and the method of submitting papers to be read at an annual meeting, which was recommended by the council and passed by the association at its last annual meeting. The motion reads as follows:

That the committee be granted full power in the selection and rejection of papers;

2. That no title shall be accepted unless accompanied by a summary of the paper giving the main points to be developed; that the summary shall be submitted typewritten in triplicate and ready for printing; that it shall not exceed one printed page of the *Proceedings*, and shall contain no tables or drawings;

3. That all titles and summaries shall be in the hands of the secretary on a certain date to be set by the committee and announced to members of the association;

4. That the titles of rejected papers shall not be listed on the program, nor their summaries published in the proceedings.

The secretary is authorized to arrange for the payment of transportation charges on new apparatus for research, useful charts and demonstration devices which the members may be willing to display. The consignments should be shipped to Dr. J. B. Miner, division of applied psychology, Carnegie Institute of Technology. A convenient room for exhibiting apparatus will be provided. Members, however, should supervise the setting up of their apparatus and the re-packing of it, so as to relieve the local committee from responsibility for possible injury. There will be also an opportunity to exhibit mental and educational tests, with charts or tables of results and directions for giving each test. These will be placed with the apparatus exhibit.

H. S. LANGFELD,
Secretary.

HARVARD UNIVERSITY

THE SECTION OF EDUCATION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION L of the American Association for the Advancement of Science will hold its annual meeting at Pittsburgh, on December 29 and 31, and January 1.

The general subject of the program is the scientific study of educational problems. Any paper dealing with a topic of this character will be acceptable. This year the section will be particularly glad to receive papers dealing with

1. Studies of the Reliability of Educational or Mental Tests.
2. Correlations between Educational Abilities.
3. New Tests for the Measurement of Educational Products.
4. Studies of the Relative Efficiency of Different Methods of Teaching.
5. Scientific Determinations of Desirable Content for Courses in Study.
6. Studies of the Diagnosis and Remedy of Educational Defects.

Membership in the Section is open to all interested in education, and the sectional committee will be glad to consider any papers submitted. You are hereby invited to take part in the meetings of the Section, or, if you are unable to contribute a paper yourself, to aid in the work of the section by bringing this invitation to the attention of any person known to you to be attempting the scientific evaluation of the effects of any educational experiments in which they may be engaged.

All titles should be sent to the secretary by November 24, before if possible.

S. A. COURTIS,
Secretary Section L

SCIENTIFIC NOTES AND NEWS

A MEMORIAL meeting for Professor Wm. Bullock Clark was held at the Johns Hopkins University on the Sunday afternoon of November 4, President Frank J. Goodnow presiding. The speakers were Dr. Charles D. Walcott, the secretary of the Smithsonian Institution; Mr. R. Brent Keyser, the president of the board of trustees of the university; Professors Harry Fielding Reid and J. S. Ames, of the faculty, and Judge J. T. C. Williams, of the Baltimore Juvenile Court.

DR. ALONZO E. TAYLOR, of the University of Pennsylvania, now of the food administration at Washington, is a member of the American Commission to the Allied War Conference to be held in Paris on November 15.

PROFESSOR A. O. LEUSCHNER, director of the astronomical department of the University of California, at Berkeley, has been delegated by the director of instruction in the navigation schools of the United States Shipping Board, to administer the details of instruction on the Pacific coast and in particular to provide qualified instructors.

DR. F. B. KINGSBURY, assistant professor of physiological chemistry in the University of Minnesota, has been granted leave of absence for the duration of the war. He has been commissioned first lieutenant in the sanitary corps of the Army and will be directly under Major John R. Murlin, of the Food Division. His work at first will be in the army medical school, in preparation for the nutritional survey of the army camps and cantonments here and at the front.

DR. ALEXANDER HAMILTON RICE, the explorer, has been commissioned senior lieutenant in the

naval reserves. He will have charge of the departments of astronomy and navigation in the Naval Cadet School at Newport, R. I.

Professor Richard W. Husband, of Dartmouth College, whose services have been loaned to the State Committee on Public Safety, will write a complete history of New Hampshire's part in the war. Men have been named to compile statistics in the cities and towns.

Popular Astronomy states that Dr. F. C. P. Henroteau, of Brussels, has been appointed Martin Kellogg Fellow in the Lick Observatory for the year 1917–18. Since leaving Brussels, in August, 1914, Dr. Henroteau has spent fourteen months in work at Stonyhurst College Observatory, in England, and nearly a year and a half at the Detroit Observatory, Ann Arbor, Michigan. Mr. Holger Thiele has also been appointed fellow in the observatory for the year 1917–18 and is now in residence. Mr. Thiele was assistant in the observatory at Bamberg, Bavaria, in 1900–01, in the observatory at Copenhagen 1901–07 and in the observatory at Bergdedorf, Hamburg, from 1908 to February, 1917.

Dr. J. C. Witt, for the past two years engaged in industrial research at the Bureau of Science, Manila, has been appointed technical director of the Rizal Cement Company. This company operates the only cement mill in the Philippine Islands.

At the Museum of the University of Pennsylvania, Dr. G. B. Gordon, the director of the museum, is away on a six months' leave of absence and Dr. W. C. Farabee has been appointed acting director in his place; Mr. H. U. Hall, assistant curator of the section of general ethnology, is now with the Second Pennsylvania Field Artillery at Camp Hancock, Augusta, Georgia; Mr. B. W. Merwin, assistant curator in the American section, has left the museum for military service, and is stationed at Macon, Georgia.

Mr. W. Elmer Ekblaw of the University of Illinois, has been appointed research associate in geology in the American Museum of Natural History for the years 1917 and 1918, in recognition of his record and services on the Crocker Land Expedition during the years 1913 to 1917.

Honorary membership in the Chemists' Club, New York City, was conferred upon Professor Grignard, of the French Mission, at a joint meeting of the New York Section of the Society of Chemical Industry, American Chemical Society and the American Electrochemical Society, on October 19. An address was made by Professor Grignard.

Owing to the resignation on account of ill health of Mr. W. B. Worthington, president of the Institution of Civil Engineer of Great Britain, Mr. H. E. Jones, a vice-president, has been nominated president for the ensuing year.

At the annual statutory meeting of the Royal Society of Edinburgh, held on October 22, the following office-bearers and members of council were elected: President, Dr. J. Horne; vice-presidents, the Right Hon. Sir J. H. A. Macdonald, Professor R. A. Sampson, Professor D'Arcy Thompson, Professor J. Walker, Professor G. A. Gibson, and Dr. R. Kidston; General Secretary, Dr. C. G. Knott; Secretaries to Ordinary Meetings, Professor A. Robinson and Professor E. T. Whittaker; Treasurer, Mr. J. Currie; Curator of Library and Museum, Dr. A. C. Mitchell; Councillors, Dr. J. H. Ashworth, Professor C. G. Barkla, Professor C. R. Marshall, Dr. J. S. Black, Sir G. A. Berry, Dr. J. S. Flett, Professor M. Maclean, Professor D. Waterson, Professor F. O. Bower, Professor P. T. Herring, Professor T. J. Jehu, and Dr. A. Lauder.

Professor E. C. Jeffrey, of Harvard University, gave a lecture on "The Origin of Coal" at Wellesley College, on November 6.

The three hundred and thirty-fourth meeting of the American Institute of Electrical Engineers was held in the Auditorium of the Engineering Societies Building, New York, on November 9. The paper of the evening was entitled "An experimental method of obtaining the solution of electrostatic problems with notes on high-voltage bushing design," by Mr. Chester W. Rice, of the General Electric Company.

WE learn from *Nature* that on October 10 a memorial tablet was unveiled at Oxford, commemorating the life and work of Roger Bacon. The tablet has been fixed to the old wall of the city, dating from early in the thirteenth century, close to the site of the Grey Friars Church in the precincts of which Roger Bacon was buried. The church has long since disappeared, but the position of the burial ground, though not the exact spot of Bacon's grave, is known. After the celebration at Oxford in 1914 of the seven hundredth anniversary of Bacon's birth, it was thought fitting that in addition to the statue then created in the University museum, a permanent and public memorial should be set up as near as possible to the site of the Franciscan friary in which Bacon passed so many years of his strenuous life. This has now been accomplished.

THE death is announced, at seventy-three years of age, of Professor A. J. F. Dastre, director of the laboratory of animal physiology at the Sorbonne, and a member of the Paris Academy of Sciences.

DR. ADDISON, the minister of reconstruction of Great Britain, has appointed a committee to consider and report on questions connected with the supplies of raw materials which will be required by British industries for the purpose of restoring and developing trade after the termination of the war and the best means of securing and distributing supplies, due regard being had to the interests of the Allies. The committee, which will be known as the Central Committee of Materials, consists of the following members: Sir Clarendon Hyde (chairman), Sir H. Birchenough, K.C.M.G., Mr. Cecil Budd, Sir C. W. Fielding, K.B.E., Sir H. Babington Smith, K.C.B., Mr. W. Thorneycroft and Mr. A. Weir. The secretary is Mr. J. F. Ronca, who should be addressed at the Ministry of Reconstruction, 2 Queen Anne's Gate Buildings, Westminster, S.W. 1.

WE learn from *Nature* that a meeting was held at the Manchester School of Technology on November 10, under the chairmanship of Dr. Alfred Rée, for the purpose of inaugurating a British Association of Chemists. The objects of the proposed association are (*a*) to obtain power to act as sole registration authority for all chemists; (*b*) to have the word chemist legally redefined; (*c*) to safeguard the public by obtaining legislation ensuring that certain prescribed chemical operations be under the direct control of a chemist, and (*d*) to raise the profession of the chemist to its proper position among the other learned professions, so that it may attract the attention of a larger proportion of the best intellects, and thereby secure a supply of highly trained chemists adequate to the industrial needs of the country. The secretary of the Provisional Committee is Mr. R. E. Crowther, 3 Langford Road, Heaton Chapel, near Stockport.

AT the Pittsburgh meeting of the American Association for the Advancement of Science, Section G—Botany, will hold on Saturday, December 29, at 2 P.M., a joint session with the Botanical Society of America and the American Phytopathological Society. The program will be as follows:

"The near future of botany in America" (vice-presidential address), C. Stuart Gager.

Invitation Papers Relating to War Problems in Botany

"A new wheat disease in relation to the national food supply," Erwin F. Smith.

"Plant disease survey work and its relation to food production." G. R. Lyman.

"Forestry problems after the war." I. W. Bailey.

"War work of the botanical committee of the National Research Council," John M. Coulter.

THE course of scientific lectures of the California Academy of Science have been continued on Sunday afternoons at 3 o'clock in the Auditorium of the Museum in Golden Gate Park. Announcements for the month were as follows:

October 28. Mr. Henry H. Hart, assistant city attorney. San Francisco, Hawaii Nei. (Illustrated.)

November 4. Dr. Bailey Willis, head, department of geology, Stanford University, The Chinese at home. (Illustrated.)

November 11. Professor G. A. Coleman, college of agriculture, University of California, Natural

history and manipulation of bees. (Illustrated by moving pictures.)

November 18. Professor George D. Louderback. department of geology, University of California. Geological explorations in China. (Illustrated.)

These lectures are well received by the people of San Francisco and the number of regular attendants is particularly noteworthy. The auditorium of the academy has been filled to its capacity several times during the past month.

The forty-second year of the *Ecole d'Anthropologie de Paris* opened on November third with courses offered as follows:

1. R. Anthony, Development of the brain in man and the apes.
2. L. Capitan, Art and architecture during the neolithic and protohistoric periods.
3. G. Herve, Ethnology and ethnography in France during the eighteenth century.
4. P. G. Mahoudeau, The precursors and the authors of evolution: Buffon, Lamarck, Darwin.
5. L. Manouvrier, Ethnic psychology.
6. A. de Mortillet, Burial customs among ancient and modern primitive races.
7. C. Papillault, Psycho-social values and sophisms.
8. F. Schrader, Geographic causes of rapprochement and differentiation among human groups.—Evolution of the old world.
9. J. Vinson, Primitive languages, popular language, folk-lore.

In addition there are two short courses of eight lectures each on: (1) The survival of primitive industries, by D. Bellet; and (2) Falsehood from the viewpoint of anthropology and criminology, by Paul-Boncour.

UNIVERSITY AND EDUCATIONAL NEWS

Yale University receives the sum of $300,000 by the will of Mrs. Charles W. Harkness, who died on December 6, 1916.

Harvard University has received a bequest from the estate of Horace Davis amounting to $10,000, the income of which is to be used for the purchase of books for the Harvard University Library relating to the Northern Pacific Ocean and its shores. The university has also received a gift of $50,000 from Mrs. S. Parkman Blake, the income to be used "for the care of the yard or other grounds of the university." The gift is a memorial to her husband, S. Parkman Blake, of the class of 1855, and to her son, Robert Parkman Blake, of the class of 1894.

In accordance with the terms of the will of the late Richard Black Sewall, of Boston, there are public bequests amounting to $380,000, and the residuary legatees are Harvard University and Yale University. The Boston Museum of Fine Arts, the Massachusetts Institute of Technology, the Worcester Polytechnic Institute, Williams College and Amherst College each receives $30,000. Tuskegee Institute and Hampton Normal Institute are each given $5,000.

The Converse Library at Amherst College was dedicated on November 8. The new $250,000 building is the gift of Edmund C. Converse, of New York, in memory of his brother, James B. Converse, who was a member of the class of '67 at Amherst. Mr. Converse, Herbert Putnam, librarian of Congress, and George A. Plimpton, of New York, president of the college board of trustees, took part in the exercises.

The University of Rochester has expanded its work in psychology. Quarters are now provided for an experimental laboratory, and are thoroughly equipped for experimental purposes. Two experimental courses will be given during the present year. One course, extending through the college year, emphasizes the psychology of the sense organs and more complex mental processes. The second course takes up the study of comparative psychology. Quarters for animal experimentation have been provided. The course is under the charge of L. A. Pechstein, Ph.D. (Chicago).

Arthur L. Foley, head of the department of physics of Indiana University, has been elected research professor in the Waterman Institute, the first to be elected to this position. The institute was founded and endowed a few years since by Dr. Luther Dana Waterman, a retired physician of Indianapolis. It is under the control of the trustees of Indiana University and is in part supported by the uni-

versity. The entire income of the Institute is to be devoted to research. Professor Foley retains charge of the physics department of the university, but is relieved of all teaching duties.

DR. H. D. SENIOR, head of the department of anatomy of New York University and Bellevue Medical College, is in England engaged in military medical work. Dr. F. W. Thyng is acting professor of anatomy and head of the department in Dr. Senior's absence, and has charge of histology and embryology. Dr. E. R. Hoskins is acting assistant professor and is in charge of gross anatomy and neurology. Dr. J. L. Conel and Dr. Margaret M. Hoskins are instructors in histology and embryology and Dr. C. Hield is instructor in gross anatomy and neurology. The school year began with 190 students in the first-year class, an increase of 13 over last year.

WARREN G. WATERMAN has been appointed assistant professor of botany at Northwestern University, having completed his work at the University of Chicago, where he received the degree of doctor of philosophy at the August convocation.

PROFESSOR D'ARCY WENTWORTH THOMPSON, professor of natural history, University College, Dundee, has been appointed to the chair of natural history at St. Andrews, vacant through the retirement of Professor W. C. McIntosh.

DISCUSSION AND CORRESPONDENCE

BOTANY AND COMMON NAMES OF PLANTS

TO THE EDITOR OF SCIENCE: Those who favor using the common names of plants, instead of the technical names, probably do not realize the confusion that would result in most instances, where exactness is necessary or desirable, if their suggestions were followed. Imagine the pharmacist relying solely upon the common names in selecting such drugs as mandrake, bitter-sweet, coltsfoot and sarsaparilla. Some of his patrons would surely be poisoned and others would die for want of the proper remedy. Scientific names were given to plants for the express purpose of facilitating exact reference to them and it is a mistaken kindness to teach children and others the common names under the impression that the technical terms are too difficult. Any child who can be taught to say rhinoceros, chrysanthemum or rhododendron can be taught the scientific names of plants and thereby advanced on the road to knowledge, instead of being plunged into a morass of inexact and untrustworthy common names, however poetic. As a matter of fact there is as much poetry and folk-lore in the scientific names as in the common ones. Consider Campanula, Phlox, Asplenium and Helianthemum. Are these less euphonious or poetic than such "common" names as Judge Daly's sunflower, Stewardson Brown's Indian turnip, or Brainerd's cat's foot? There is undoubtedly much literary value in the common names of plants, but the same can not be claimed for the "English" or vernacular names with which we have been deluged of late. A common name is a name that is in common use for the plant in some part of the world and therefore entitled to consideration, but an "English" name is too often merely a poor translation of the scientific name and therefore better left in the original. Common names or, if you please, vernacular names, are still being coined—Christmas fern, foam flower, boulder fern, Darwin tulip, and obedient plant are good illustrations—but who expects such "English" names as repand-leaved erysimum, Hooker's musinon, Gregg's haploesthes, and tall flat-topped white aster to ever become common? In the opinion of many good observers the declining popularity of botany as a high-school study is due in large measure to the efforts of those well-intentioned but misguided popularizers of plant study who either by assertion or implication give to the scientific study of plants a reputation for difficulty which it does not deserve.

It is well to reflect, therefore, that common names can not be made by fiat. If a plant has a common name, we may well use it in the region where the name is common and therefore understood, but to imagine that there is any special sanctity in the common names as such and to insist upon their use on all occasions is as absurd as for the scientist to use technical

terms in speaking of familiar species. In all cases where exactness is necessary, even well-known common names will not serve, for often a single plant will have several names or a single common name may be applied to several plants. In spite of the conspicuous differences that still exist between the adherents of the "American Code" and those who advocate the "Vienna Rules," the scientific names are still the safest to go by and all botanists would do well to insist upon their use. The sooner the general public discovers that even technical botany is still "the amiable science" the better it will be for all concerned.

Willard N. Clute

Joliet, Ill.

LACEPÈDE OR LACÉPÈDE

In going over "The Genera of Fishes" recently published by Dr. David Starr Jordan, assisted by Barton Warren Evermann, I discover that these authors accept and adopt the view expressed by Sherborne in his "Index Animalium," p. lvii, where, under the head of "Additions and Corrections," Sherborne says:

> A letter dated 1831 is signed "b.g.é cte de lacepède." This spelling and accentuation should be adhered to.

The writer is very much inclined to think that both Sherborne and the learned authors of the recent paper on "The Genera of Fishes" err in accepting the accentuation of the name of the great Frenchman found attached to a scrap of paper bearing his name, which was evidently written in haste. "One swallow does not make a spring," and one hurriedly written autograph with the omission of the acute accent over the first "e" in the word does not prove that this was the correct way of writing the name. The writer of these lines is called upon every month to attach his signature hundreds of times to vouchers and other documents. He ordinarily puts a period after his initials, W and J; but only yesterday, having signed some two hundred vouchers, he observed that in the haste of doing so he had in a number of cases omitted the period after his initials. Personal observation shows him that just so it is not an infrequent thing for French gentlemen in hurried writing to omit an accent.

In the judgment of the writer of these lines the existence of one letter in which the French ichthyologist signed himself "lacepède" should not avail against the fact that in all his published writings the other method of accentuation prevails, that all biographies, encyclopædias, and dictionaries, in which the name occurs, give it as "Lacépède." If he were the only person who had borne the name there might be some weight attached to the signature, which Sherborne has turned up; but there were and are others in France who bear the name, and any one who takes the trouble to consult a French dictionary or encyclopædia of biography will find that invariably the name is and has been spelled "Lacépède." The name is so spelled in Buffon, who was the friend and contemporary of Lacépède, and I think it seems "rather late in the day" to change the universally accepted spelling of the name of the well-known naturalist on the strength of the L. S. discovered by Sherborne.

To be consistent, if the acute accent is omitted on the first "e," the capitals should also cease to be employed, not only in the family, but also the Christian names of Lacépède, for in the autograph which Sherborne quotes the name is written throughout without capitals. After carefully weighing the matter the writer is of the opinion that Buffon, the authors of the "Dictionnaire Universelle," and the thousand or more Frenchmen engaged in scientific research, who have for over a century written the name "Lacépède" are more likely to know what is correct than the author of the "Index Mammalium," who, having unearthed this L. S., has on the strength of it proceded in this particular to overthrow the usage of more than a century, and the usage of those who were the friends and acquaintances of Lacépède himself.

W. J. Holland

Pittsburgh, Pa.,
October 17, 1917

FORBES WINSLOW MEMORIAL HOSPITAL

To the Editor of Science: The British Ministry of Pensions has recognized and authorized for trial psychical treatment for

soldiers suffering from shell-shock and nervous breakdown. It can not be too widely known that this is exactly the treatment practised at the British Hospital, 72 Camden Road, London, N. W. 1, England, for over a quarter of a century. The hospital has given effective and permanent relief gratuitously to thousands of men, women and children. The war has obviously increased the number of cases suffering from shell-shock and nervous breakdown to a marked extent, and the hospital is at present appealing for additional funds to cope with the position, and also with the object of sending patients into the country, so necessary for their speedy recovery.

Will our American friends help us? Donations, however small, will be greatly appreciated and may be sent to me or the Secretary, Mr. F. J. Lee-Smith, 72 Camden Road, London, N. W. 1, England.

MARGARET FORBES WINSLOW

QUOTATIONS

INCREASED RANK AND MORE AUTHORITY FOR MEDICAL OFFICERS

As most of our readers are aware, an amendment was introduced into Congress at the recent session which, if it had been adopted, would have given the medical officers in the Army the same rank that prevails in the Medical Corps of the Navy. Specifically the amendment provided that there should be twenty-five one-hundredths of 1 per cent. of major-generals, the same proportion of brigadier-generals, 4 per cent. of colonels, 8 per cent. of lieutenant-colonels, 23.5 per cent. of majors, 32 per cent. of captains, and 32 per cent. of lieutenants, *this to apply to both the regular and the reserve corps men.* Thus, if there are 10,000 medical officers in active service, there might be 25 major-generals, 25 brigadier-generals, 400 colonels, 800 lieutenant-colonels, 2,350 majors, 3,200 captains and 3,200 first lieutenants. This amendment lapsed without action by the ending of the session. The substance of the amendment, however, will be incorporated in a bill which will be introduced in both the Senate and the House at the coming session of Congress.

Medical officers must be equal in rank and authority with line officers if they are adequately to carry out the duties for which they will be held responsible. This fact has been emphasized by the experience of our allies in the present war, as well as by our own experience in the past. Our allies admit that in the beginning the medical officer did not have the rank, and consequently the authority, he should have had and that, for this reason, there have been grievous consequences. Among these was the disastrous experience of the British Army in the Mesopotamian campaign as a result of the failure of the medical service. The report of this tragedy, made by a board of nonmedical men, showed that lack of authority of the medical officers was an important factor. The medical officers were practically ignored. They were not advised as to the character of the expedition that was being undertaken, and as a consequence, they were unprepared for what happened. When later a medical officer made urgent representations in regard to the actual conditions obtaining, which in his opinion needed prompt action, he was threatened with arrest and removal from his post. When the actual results came the blame was thrown on the medical department, of which this medical officer was a member. The medical officers were censured because they had not protested more vigorously. We had a similar experience in 1898 when our medical officers were criticized for insanitary conditions at Chickamauga and elsewhere, although there was plenty of evidence to show that they had protested against these conditions to line officers. The whole sad story is told in detail in the Dodge report. There, also, will be found testimony that line officers treated with contempt the recommendations and protests made by medical officers. The medical officer is without influence simply because his shoulder straps indicate lower rank than that of the line officer with whom he is associated. Some may sneer, but the fact remains that it is rank that counts in both the Army and the Navy.

Of course rank brings with it increased pay. This, however, is immaterial. At the same

time, it should not be forgotten that most of the physicians now in the Medical Reserve Corps have not only left the comforts of their homes, but also have given up practises which in the majority of instances yielded far more income than the pay they would receive as medical officers of the Army even if they had conferred on them the highest rank that the proposed law would provide. Among these medical reserve officers are many of the most prominent men in our profession, including the leading men in the specialties, as well as our best surgeons and internists.

When the war broke out there were less than 450 medical officers in the regular Army Medical Corps. To-day there are commissioned, including officers of the regular Army, the National Guard and the Medical Reserve Corps, at least 17,000 physicians. Less than 1,000 are in the regular Army Medical Corps. Under the present law these regular Medical Corps officers are entitled to the grades of lieutenant-colonel and colonel; and in the case of the surgeon-general, to that of brigadier-general;[1] the highest rank that can be conferred on any one of the other 16,000—that is, on any reserve medical officer—is that of major.

May we remind our readers that the men in active service will be prevented by the regulations from using their influence in this matter, and that the duty of pushing this measure rests on those who stay at home? Every physician has representing him in Congress one man in the House of Representatives and another in the Senate. If every physician will let his representatives know that this proposed measure should become a law, and if in addition he will enlighten his neighbors in regard to the matter, an effective public opinion will be created. The time is opportune; congressmen are at their homes. Write or speak to your representatives now; get your neighbors to do likewise—not for the good of the medical profession, but for the good of the service.—*The Journal of the American Medical Association.*

[1] Surgeon-General Gorgas has the rank of major-general by special act of Congress.

SCIENTIFIC BOOKS

The Biology of Twins. By Horatio Hackett Newman, Associate Professor of Zoology, and Dean in the Colleges of Science, University of Chicago. University of Chicago Press, 1917. Pp. 1–185. 55 figures in the text.

Polyembryony, or the production of more than one individual from a single fertilized egg, although a phenomenon occurring constantly in some groups of animals, and occasionally in others, including man, is as yet unmentioned in our text-books of general zoology, where the impression is given, or the statement even definitely made, that, except as the result of experiment, a single zygote, resulting from a normal fertilization, invariably results in the formation of a single individual.

That in the Texan armadillo a single egg always produces four individuals, and that a much more numerous progeny results from a single egg in certain of the gall-wasps (*Copidosoma*), are facts that are now forcibly brought to the attention of zoologists through the long and arduous labors of the two associates, H. H. Newman and J. W. Patterson.

While the original papers are necessary for one seeking the details, the essential points obtained by these and other investigators to date have been placed in a single small volume where, appearing in a not too technical dress, they are readily and conveniently available, not to zoologists alone, but to the thinking public in general.

The work is based upon the Texan armadillo (*Dasypus novemcinctum*), which produces four young at a birth, all of the same sex. After an introduction and a preliminary chapter, setting forth what is commonly known concerning twins in general, mainly human, and their probable relation to double monsters, there follows in Chapter II. an almost complete sketch of the development of the nine-banded armadillo. This sketch includes "the whole range of stages from ovogenesis to birth, with but one gap which, it is hoped, the near future will see filled in." This gap is that of the early cleavage stages, but as a partial substitute for these Newman refers to his paper of

June, 1913 (*Biol. Bull.*), in which he records his observations on certain non-fertilized eggs, in which cleavage advanced parthenogenetically as far as the eight-cell stage, apparently in normal manner. In this chapter the gastrulation, the germ-layer inversion, and the formation of first two and then four embryos from the embryonic area, are given in order, followed by the subsequent separation of the four distinct embryos, each with its own amnion and placenta. Corresponding to their origin, two secondary embryos from the two primary ones, the four are distinctly paired, the two of each pair revealing a more complete identity than does either one when compared with a member of the other pair, and this relationship in certain extra-embryonal features, such as the approximation of the placentas of each pair, is shown in anatomical relations up to birth.

The condition in other species and genera of armadillo is presented in Chapter III., which shows that the number of young varies from *eight* (occasionally 7–12), polyembryonic ones in *Dasypus hybridus,* to *Euphractus villosus,* which is not polyembryonic, but produces fraternal twins from two separate eggs, or, occasionally, bears only a single young. The facts for this chapter are furnished largely by the work of Fernandez of the Museo Nacional at La Plata (Argentina), who has made special studies on the armadillos of South America, and whose first account of the polyembryony of *Daypus hybridus* appeared in 1900 (*Morph. Jahrb.*) almost simultaneously with the first paper of Newman and Patterson on the same phenomenon in *D. novemcinctus* (*Biol. Bull.*).

Chapter IV., although short, has a special interest since in it the author discusses causes of polyembryonic development, thereby bringing in something of the many theories that have been brought forward to account for human twins, at least those of the *duplicate* or monochorial type. The author considers the phenomenon one of fission, "if by fission we mean merely the physiological isolation of several secondary points in a single embryonic vesicle, and the consequent acquisition by these points of independence in growth and development" (p. 93). He assumes a considerable amount of differentiation to have occurred before these points become isolated, "so that genetic factors are unequally distributed in the various regions which give rise to the new apical points," and thus if two embryos are developed from closely adjacent territory they are likely to be more nearly alike than those which are a greater distance apart on the blastoderm. This accounts for the phenomenon, substantiated by hundreds of observations, that the closely adjacent twins of a pair, where the placentas are nearly in contact, are closer duplicates that are individuals taken from the two pairs.

Chapter V. considers the phenomenon of the free-martin in cattle, or the occurrence of a normal male twin with an imperfect twin, variously considered an hermaphrodite, an imperfect female, or an imperfect male. The author was fortunately able to avail himself of the work of Lillie and his pupil Miss Chapin, previous to its publication (*J. Exp. Zool.,* July, 1917) and thus presents this work as revealed by the latest investigation. This shows conclusively that the free-martin is a sterile female, with abortive gonads, and with certain of the secondary characters of the male due to the influence of male hormones from the associated male, obtained from the blood circulating in the common placenta. This is a totally different phenomenon from that presented by armadillos, as the twins are here of the fraternal type (*dizygotic*), and in the latter true duplicates (*monozygotic*).

The two final chapters, VI. and VII., show the various contributions to general biological problems afforded by the study of twins, especially in the case of variation and heredity, and here the work of the author and his associate on armadillos, where the scales of the carapace are used to show the amount of identity, links up extremely well with that of Wilder on human twins, who has employed in a similar way the conformation of the friction-ridges of the palms and soles. Indeed, there is probably more than a general correspondence in method between these two independent series of investigations, since it is altogether likely that the human friction-ridges are

formed of rows of integumental scales, and that they are thus the same sort of organ as are the bands of the armadillo carapace, which Newman finds so convenient for the comparison of individuals.

The last and longest chapter, Chapter VII., gives a detailed study of the results of both lines of investigation, and presents, with numerous illustrations the strange correspondences in detail in the external characters of monozygotic twins, whether found in the carapace of the armadillo, or in the palm and sole ridges of man. These two series of studies serve to strengthen each other, and are shown to be essentially similar phenomena, of great biological significance. In the facility with which embryonic material of every stage may be obtained the armadillo has a decided advantage over man as a *Versuchstier,* although in the enormous amount of detail presented by human palms and soles, and the readiness with which they may be compared in the form of prints, there are certain distinct advantages in the study of man. If once the essential identity of the phenomenon of polyembryony in *Dasypus* and *Homo* be generally recognized, those parts of the history of human duplicate twins (and perhaps, of double monsters as well) which are beyond our power to observe directly, may be satisfactorily supplied through the study of the corresponding stages in the armadillo; while the correspondences in the friction-skin configuration of human monozygotic twins may be added to those observed in the carapace of the armadillo to show the amount of power possessed by the germplasm, or some other element or elements of the egg, to determine the details of the adult soma.

H. H. W.

Economic Geology. By Heinrich Ries, A.M., Ph.D. Fourth edition. John Wiley and Sons.

The appearance of the fourth edition of this excellent and standard book on the subject, in the midst of a year of battle largely as to supplies of war materials, deserves attention, since the change of publishers has been marked by thorough rewriting and extensive additions.

The statistics and references are brought down to 1914–15, showing the first effect of the war, but not the rebound. Not only are there 25 per cent. more illustrations, but many of the less legible ones are redrawn and greatly improved. Compare, for instance, those on pages 529 and 545 of the new with the corresponding figures on pages 367 and 378 of the old. A large number of half tones taken by the author show that the descriptions of the various ore deposits are not mere compilations. This is perhaps the main use of some of them, for undated views of a mine do not show what now is. Would it not be well if in scientific works the date of views were always given?

The main improvement of the book, however, is that it now includes descriptions, in but slightly smaller type, of the chief rival ore deposits in other countries, and thus makes possible a much more comprehensive handling of the great question of ore deposits. For instance, the Swedish deposits of Kiruna receive first-hand treatment, and there is a plate of a section of Luxembourg iron ores. While the treatment is and must be brief, there are always one or two recent references to start one on further search. The summaries of different views as to the origin of ores, for instance, Cuban ores, though brief, are well done. While the author does not hesitate at times to express his own views, yet he gives rival views. The account, for instance, of the oölitic iron-ore deposits could hardly be improved for so brief a statement.

While of course the publications of the United States Geological Survey have been largely used, they are by no means the exclusive source, and the various publications of the mining engineering societies have been also duly consulted.

The table of geographic and geologic distribution of coal in the United States is a new and valuable feature, and the general subject of coal receives very satisfactory treatment. If the source of the analyses of coal on pages 8 and 9 is given it has been overlooked by the reviewer.

The treatment of copper has been brought to date by reference to the Nonesuch Lode.

But in the footnote at the bottom of page 609, by the term "Lake ore" the writer really means "Lake copper" and his statement that "the term has now lost its original meaning" is hardly justifiable, since in the first place for "ore" one should read "copper," and in the second place, that western copper should have been almost fraudulently sold as Lake copper does not signify that the term has lost its meaning; otherwise there would have been no object in the trick. In fact the difference in selling price between Lake copper and electrolytic copper has been unusually great at times during the last three years.

Although of course, the book is primarily a text-book, yet the summaries of different theories as to ore deposits (see, for instance, the discussion of Mississipi zinc), often largely based upon original studies, are so valuable that no one interested in its field can afford to be without the book.

ALFRED C. LANE
TUFTS COLLEGE

SPECIAL ARTICLES

EXPERIMENTS WITH A FOCAULT PENDULUM

In the issue of SCIENCE for March 16, last Dr. Carl Barus, under the above title, described certain measurements of the rotation of the plane of oscillation of a Focault pendulum. The present note gives, for the same determination, another method that is simple, direct and of fair accuracy.

FIG. 1.

If in Fig. 1 the point A represent an arc lamp that, through the slit B, illuminates a portion of the scale D; and if PQ represent the plane of vibration of a Focault pendulum at a given time, it is evident that the diffraction pattern of the wire will travel up and down the scale as the pendulum oscillates. Further, as the plane of the vibration rotates about the center at C, the amplitude of the motion of the shadow on D will decrease, and will become zero at the instant when the oscillation plane includes the line DCA. This amplitude of the shadow's motion will increase again as the plane of vibration continues its rotation towards the position RS. If the position on the scale of one edge of the central band be taken at each successive elongation of the pendulum; and if these readings be plotted against the time (in terms of the period of the pendulum) two approximately

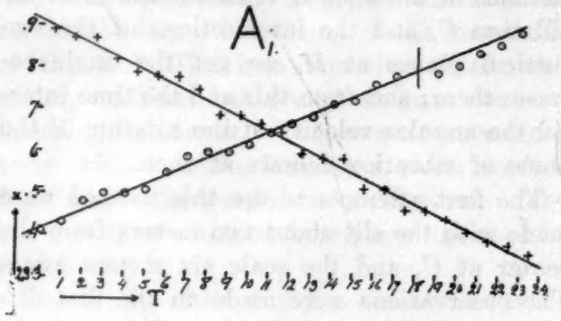

FIG. 2a.

straight lines will be obtained. The coordinates of the intersection of these lines will give (1) the point on the scale where it is cut by the vertical plane that includes the line AC; and (2) the time (in terms of the period of the pendulum) of the coincidence of the plane of vibration with the vertical plane defined in (1) (see Fig. 2, *a* and *b*).

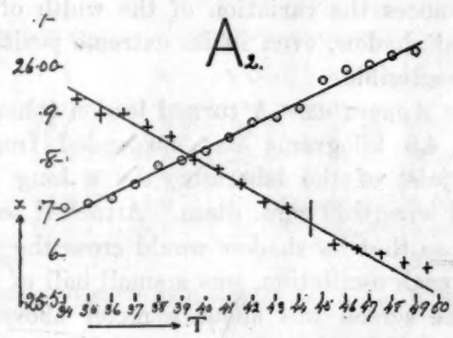

FIG. 2b.

If, next, the lamp be moved to a position indicated in Fig. 1 by A' a similar set of observations will determine a second vertical plane and the time of passage of the plane of vibration through it. The number of oscillations that elapse between a given observation of the first set and a given observation of the

second set is determined by starting a stopwatch as the first reading of the first set taken, and stopping it at the first observation of the second set. This time divided by the known period of the pendulum will fix the number of oscillations from the first of one set to the first of the other, *i. e.*, it will give the oscillation number of the first elongation of the second set, the initial elongation of the first set being taken as zero. Thus knowing the distance of the scale D from the center of oscillation C, and the intersections of the two vertical planes at D, we get the angle between them; and from this and the time interval the angular velocity of the rotation of the plane of vibration follows at once.

The first attempts to use this method were made with the slit about two meters from the center at C, and the scale six meters away. The observations were made on the first diffraction minimum to one side of the pattern, but the decay of the amplitude of vibration introduced here an undeterminable correction which was too large to be neglected. The final procedure was to put the arc about six meters from the center and to bring the scale to two meters. Readings were then made of the edge of the central dark shadow—the bright line in the middle of the shadow being too faint for quick reading. Under these circumstances the variation of the width of the central shadow, even in its extreme positions, was negligible.

The Apparatus.—A turned leaden sphere of mass 4.8 kilograms was suspended from a roof joist of the laboratory by a long steel piano wire 0.39 mm. diam. Attached to the wire, so that its shadow would cross the scale D at each oscillation, was a small ball of wax. As the screen was about a meter above the floor and the arc about 20 centimeters, this shadow was at its highest point at one maximum elongation of the bob and at its lowest at the other. By noting the motion of the shadow of the wax ball at the ends of its path one could detect any tendency to elliptical motion of the bob. The prevention of such motion is, of course, one of the difficulties in securing good results.

The period of the pendulum was 7.50 secs.

To start the oscillation the bob was drawn back 40 or 50 cm. from its equilibrium position and held there by a belt of thread that passed about its equator and through a small horizontal pulley, which latter was fastened to a standard by the thread which was to be burned in releasing the pendulum (see Fig. 3). The object of the pulley was to prevent torsional strain in the wire, but as the restoring couple was so small for the wire in question it was found best to place a mark on the sphere after it had been hanging at rest for some time, and to adjust the ball in its belt so that the mark was at its original azimuth. Next, to damp out side motion of the bob the following device proved efficient; a flat disc of cork (about 2 cm. diam.) was fixed centrally on the inside of a light tin dish (top of a coffee can, 11 cm. diam. See Fig. 3) and this was floated on cylinder oil in

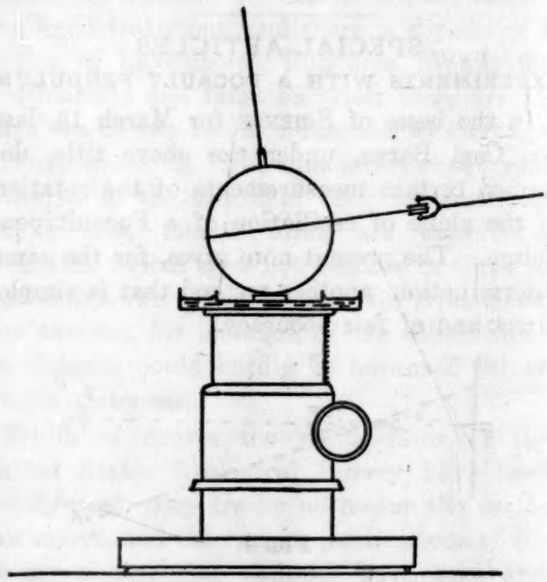

Fig. 3.

a larger vessel that was carried on a table that could be racked up and down (the front of a projection lantern). This system was placed centrally under the bob in its deflected condition, and was raised until the cork just touched the sphere. The slight friction between them caused the dish to move with the bob, so that the oil quickly damped the resid-

ual motion. When all was perfectly still—as indicated by the absence of movement of the shadow D—the damping system was lowered away and the thread behind the pulley quickly burned through. If the bob were left hanging after the removal of the damping system, air currents and the tremors of the building soon set it swinging again—for these observations were made while other operations were being carried on in the same building. After releasing the bob the position of the arc lamp was adjusted so that the amplitude of the shadow's motion was decreasing and was about 5 mm. on the scale. Readings were then made of successive elongations until the plane of the pendulum's motion had passed completely through the plane fixed by the slit and the vertical through the point C. Readings were always begun with the outward swing of the pendulum so that no ambiguity resulted from the recording only the millimeters and tenths after the first. The record for the first few points of experiment A (below) for instance was :

23.42 cm.
.89
.47
.87
etc.

Blanks (when the arc sputtered or the eye did not catch the turning point) were indicated, both in the record and on the graph, by strokes.

The determination of the point on the floor directly beneath the center of suspension was effected as follows: A metal plate with a peep-hole (1 mm. diam.) was held in the laboratory stand so that the plumb-bob, hung through the hole, fell just over the edge of one of the feet of the stand, about a meter below. A straight-edge placed on the floor against this foot, when observed through the peep-hole, defined a vertical plane. The bob was then set swinging through an arc of amplitude equal to its own radius and the position of the straight-edge was adjusted until at extreme elongations the sphere appeared tangent to the straight-edge on opposite sides successively. A line drawn along the straight-edge must contain a point vertically under the center of suspension. In this same manner two other lines, each at about 60° to the first, were determined, and the center of the resulting triangle (about 1 mm. altitude) was taken as the point required.

Trouble was found at first at the suspension point itself, but this was finally overcome by boring a 5-mm. hole half way through a stout piece of brass and finishing it through with a half millimeter drill. The wire was then inserted, the larger hole being in the lower side of the bar. The hole was then filled with solder, sufficient being used to leave the surface slightly convex. This excess was scraped away with a knife, leaving a plane surface from which the pendulum could swing. The bar was then clamped into place against the roof joist.

The details of a set of five consecutive readings taken on the fifteenth of May, 1917, are as follows:

Latitude of Kingston 44° 13′.

Period of Pendulum $T = 7.50$ sec.

Distance to scale from center of oscillation

Coordinates of intersections of lines on graph t_1, t_2, x_1, x_2.

Angular velocity of plane of vibration

$$\omega = \cdot \frac{x_2 - x_1}{(t_2 - t_1)T200}$$

Experiment	t_1	t_2	x_1 (cm.)	x_2 (cm.)	ω (Radians per Second)
A	$10.9\,T$	$39.3\,T$	23.65	25.81	5.07×10^{-5}
B	$19.5\,T$	$64.5\,T$	21.58	24.92	4.95
C	$10.5\,T$	$44.1\,T$	20.90	23.39	4.95
D	$13.3\,T$	$53.9\,T$	20.94	24.04	5.09
E	$14.4\,T$	$48.6\,T$	22.64	25.30	5.18
Mean					5.05×10^{-5}
Calculated value at Kingston					5.08×10^{-5}

Of these the experiment of shortest duration was A, which included 28.4 periods or about 3½ minutes; the longest was B, of 45 periods, or about 5½ minutes.

WILL C. BAKER

PHYSICAL LABORATORY,
QUEEN'S UNIVERSITY,
KINGSTON, ONT.,
May 18, 1917

THE PHILADELPHIA MEETING OF THE NATIONAL ACADEMY OF SCIENCES

The autumn meeting will be held at Philadelphia, November 20 and 21, in the engineering building of the University of Pennsylvania. On Tuesday evening a reception for the members of the academy and invited guests will be given by Provost and Mrs. Smith at the University Museum at 9 o'clock. The academy dinner will take place at the Bellevue-Stratford on Wednesday evening at 7.30 o'clock.

The scientific sessions are as follows:

Tuesday, November 20, 10.30–12.30

The wheat problem of the United States, Erwin F. Smith, Bureau of Plant Industry, U. S. Department of Agriculture.

The modern systematist, Liberty H. Bailey, Cornell University.

A criticism of the evidence for the mutation theory of De Vries from the behavior of *Œnothera* in crosses and in selfed lines (by invitation), Bradley M. Davis, University of Pennsylvania.

The chemical mechanism of regeneration, Jacques Loeb, Rockefeller Institute.

A comparison of growth changes in the nervous system of the rat with the corresponding changes in man, Henry H. Donaldson, the Wistar Institute.

Hereditary tendency to form nerve tumors, Charles B. Davenport, Station for Experimental Evolution, Carnegie Institution.

Food hormones or vitamines in some animal tissues (to be presented by L. B. Mendel), Lafayette B. Mendel and Thomas B. Osborne, Yale University.

Tuesday Afternoon, 2.00–4.00

The atomic weight of boron, Edgar F. Smith and Walter K. VanHaagen, University of Pennsylvania.

The effect of intravenous injection of magnesium sulphate upon tetanus—with a lantern slide demonstration by J. Auer (by invitation), Samuel J. Meltzer and John Auer.

Chemotherapy of spirochetal infections, for Drs. Jacobs and Brown, Simon Flexner, Rockefeller Institute.

Possible action of the sex-determining mechanism (by invitation), Clarence E. McClung, University of Pennsylvania.

The cause of mosaics and gynandromorphs in *Drosophila*, Thomas H. Morgan, Columbia University.

Spectrum analysis by different persistence of vision (by invitation), Herbert E. Ives, Physical Laboratory, The United Gas Improvement Company.

Wednesday, November 21, 9.30–10.30

The atmosphere and terrestrial radiation, Charles G. Abbot, Smithsonian Astrophysical Observatory.

Geometric aspects of the theory of heat, Edward Kasner, Columbia University.

Invariants which are functions of parameters of the transformation (by invitation), Oliver E. Glenn, University of Pennsylvania.

The validity of the thermoelectric equation $P = T(dv/dT)$, Edwin H. Hall, Harvard University.

A thermoelectric diagram on the P. V. plane, Edwin H. Hall, Harvard University.

The Astrapotheria of the Patagonian Miocene, William B. Scott, Princeton University.

Evolution of the Titanotheres: Final conclusions, Henry F. Osborn, American Museum of Natural History.

Study of the motions of forty-eight double stars (by invitation), Eric Doolittle, University of Pennsylvania.

A determination of the solar motion and of stream motion based on absolute magnitudes (read by Professor Hale), Gustaf Strömberg, Mt. Wilson Solar Observatory, Carnegie Institution (introduced by Walter S. Adams).

Wednesday Afternoon, 2.00–4.00

The coral reefs of Tutuila, Samoa, Alfred G. Mayer, Marine Laboratory, Carnegie Institution.

The subsidence of volcanic islands, William M. Davis, Harvard University.

A duty of the International Association of Academies, William M. Davis, Harvard University.

The work of the Anthropology Committee of the National Research Council, William H. Holmes, U. S. National Museum.

The work of the Psychological Committee of the National Research Council, Edward L. Thorndike, Columbia University.

The work of the National Research Council, George E. Hale, Mt. Wilson Solar Observatory, Carnegie Institution.

Biographical memoir of James D. Dana (read by title), Louis V. Pirsson, Yale University.

Biographical memoir of Cleveland Abbe (read by title), William J. Humphreys, U. S. Weather Bureau (introduced by A. L. Day).